

TESSELLATION LESSON PLAN

Teacher's Name: Ms. Hollingsworth
Grade Level: 9-12

Date of Lesson: April 7, 2009
Topic: Chapter 10.7 - Tessellations

Objectives

Student will understand and use basic ideas of tessellations. They will understand that by sliding, rotating, or reflecting figures will create patterns or demonstrate congruence. Understanding tessellations summarizes the material learned in the current chapter.

Student will know the basic ideas of transformations such as translation, reflection, rotation, line symmetry, and rotational symmetry.

Student will be able to create figures with rotational symmetry. Student will be able to slide, rotate, or reflect figures to create patterns, specifically tessellations.

Maine Learning Results Alignment

Mathematics

9-Diploma

C. Geometry

Transformations:

No performance indicator.

(see Transformation Performance Indicators & Descriptors: Level 5 - c).

Rationale: This lesson will introduce the concept of creating patterns by sliding, rotating, or reflecting figures.

Assessment

Formative (Assessment for Learning)

Students will use graphic organizers to draw and rotate lines to create a tessellation. They will be given a handout with definitions and examples to aide their understanding. Peers may discuss possible errors in any transformations. Students will have clarification from their peers and/or myself. Verbal feedback will be given on their graphic organizers and students will be encouraged to discuss any misunderstandings.

Summative (Assessment of Learning)

Students will use their knowledge of transformations, including translation, reflection, rotation and symmetry to create a tessellation. Once they have demonstrated a basic understanding of tessellations and have completed the "Your Turn to Tessellate" handout, they will design their piece of the class' collective tessellation.

Integration

Technology: N/A

Other Content:

- History
 - Students will relate tessellations to quilting.
- Art
 - Students will learn about M.C. Escher, a Dutch graphic artist.
 - Students will draw tessellations.
 - Students will design their piece of the class' tessellation.
- English
 - Students will be reading and discussing definitions.

Groupings

Students will work on the “Your Turn to Tessellate” handout individually, then collaborate with their classmates. During the cooperative learning activity for this lesson, students will work on designing their piece of the class' tessellation. When each student has finished their piece of the class' tessellation, the class will work together to put the final tessellation together.

Differentiated Instruction

Strategies:

- Verbal: Students will be involved in individual and class discussions.
- Logical: Students will use previous mathematical knowledge to create figures in a step-by-step process.
- Kinesthetic: Students will be moving around the classroom getting in/out of group formation.
- Visual: Students will be given visual examples of tessellations created by M.C. Escher. They will also be recreating a tessellation by drawing in a graphic organizer.
- Naturalist: Students will be using geometric transformation to create a tessellating lizard.
- Intrapersonal: Students will be allowed to discuss their work and findings among themselves. The class will work together to put their tessellation together.
- Interpersonal: Students will work individually on drawing their tessellation on the “Your Turn to Tessellate” handout and on their final lizard piece of the class' tessellation.
- Musical: N/A

Modifications/Accommodations:

I will review student's IEP, 504 or ELLIDEP and make appropriate modifications and accommodations.

In the event that a student must miss class, it is their responsibility to make up any missed work. Students should also communicate with me and/or a fellow classmate to get a full understanding of the missed material.

Extensions

N/A

Materials, Resources and Technology

- paper
- pencils/pens
- colored pencils/markers/crayons
- tape
- scissors
- poster board
- graphic organizers
- handouts (see attachments)
- textbook

Source for Lesson Plan and Research

Tessellation Lesson created by T.Hollingsworth

Materials used:

Brown, R.G. (1994). Advanced mathematics: Precalculus with discrete mathematics and data analysis. Boston: Houghton Mifflin.

Coxford, A., DiBianca, R., Highstone, V., Hirschhorn, D., Lewellen, H., Maeir, M., Oppong, N., Usiskin, Z. (2002). Geometry. Upper Saddle River: Prentice-Hall.

Cummins, J., Kanold, T., Kenney, M., Malloy, C., Mojica, Y. (2006). Geometry: Concepts and applications. China: R.R. Donnelley.

Britton, J. (2008). Escher in the classroom.
<http://britton.disted.camosun.bc.ca/jbescher.htm>

Maine Standards for Initial Teacher Certification and Rationale

Standard 3 - Demonstrates a knowledge of the diverse ways in which students learn and develop by providing learning opportunities that support their intellectual, physical, emotional, social, and cultural development.

Rationale:

This lesson provides diverse learning opportunities that support intellectual, physical, emotional, social, and cultural development. Students that have a "beach ball" type learning style, a style that requires a variety of resources, adaptive environment, choices of activities, spontaneity, and personal freedom, will have a choice about how they design their piece of the class' tessellation.

Other students that need organization, structure, visual directions, sequential learning, clear procedures and expectations, such as "clipboards", will use graphic organizers to organize information and create a visual reference for students to use. They will also have a list of definitions and examples to aide them in their understanding. The "microscope" type learners, who learn best by discovery learning, analyzing concepts, deep exploration, discussion, and focusing on details, will discover how to create a tessellation by rotating lines and creating figures. They will be able to analyze the works of M.C. Escher, and apply it to the class tessellation activity. Students will also participate in one-on-one and class discussions. Students that have a "puppy" type learning style, a style that thrives in a comfortable environment, encouraging atmosphere, supportive grouping, empathic listeners, and sensitive peer, will participate comfortable and respectful one-on-one and class discussions, and receive positive feedback from myself and peers.

- ***Standard 4 - Plans instruction based upon knowledge of subject matter, students, curriculum goals, and learning and development theory.***

Rationale:

This lesson will introduce the concept of creating patterns by sliding, rotating, or reflecting figures. Student will understand and use basic ideas of tessellations. They will understand that by sliding, rotating, or reflecting figures will create patterns or demonstrate congruence. Understanding tessellations summarizes the material learned in the current chapter.

- ***Standard 5 - Understands and uses a variety of instructional strategies and appropriate technology to meet students' needs.***

Rationale:

- *Verbal: Students will be involved in individual and class discussions.*
- *Logical: Students will use previous mathematical knowledge to create figures in a step-by-step process.*
- *Kinesthetic: Students will be moving around the classroom getting in/out of group formation.*
- *Visual: Students will be given visual examples of tessellations created by M.C. Ester. They will also be recreating a tessellation by drawing in a graphic organizer.*
- *Naturalist: Students will be using geometric transformation to create a tessellating lizard.*
- *Intrapersonal: Students will be allowed to discuss their work and findings among themselves. The class will work together to put their tessellation together.*
- *Interpersonal: Students will work individually on drawing their tessellation on the "Your Turn to Tessellate" handout and on their final lizard piece of the class' tessellation.*
- *Musical: N/A*

- ***Standard 8 - Understands and uses a variety of formal and informal assessment strategies to evaluate and support the development of the learner.***

Rationale:

Formative (Assessment for Learning)

Students will use graphic organizers to draw and rotate lines to create a tessellation. They will be given a handout with definitions and examples to aide their understanding. Peers may discuss possible errors in any transformations. Students will have clarification from their peers and/or myself. Verbal feedback will be given on their graphic organizers and students will be encouraged to discuss any misunderstandings.

Summative (Assessment of Learning)

Students will use their knowledge of transformations, including translation, reflection, rotation and symmetry to create a tessellation. Once they have demonstrated a basic understanding of tessellations and have completed the “Your Turn to Tessellate” handout, they will design their piece of the class' collective tessellation.

Teaching and Learning Sequence:

Total Class Time: 80 minutes

Minutes	Activity
0 ~ 10	Introduction to Tessellations/Review
10 ~ 20	“Your Turn to Tessellate” handout
~~~~~	2 nd lunch
20 ~ 40	“Your Turn to Tessellate” handout
40 ~ 65	Design Lizard
65 ~ 80	Class Tessellation

The classroom will be arranged for students to work with their neighbor(s). This lesson will introduce the concept of creating patterns by sliding, rotating, or reflecting figures. Student will understand and use basic ideas of tessellations. They will understand that by sliding, rotating, or reflecting figures will create patterns or demonstrate congruence. Understanding tessellations summarizes the material learned in the current chapter. To get students interested in this lesson they will be given examples of famous tessellations created by M.C. Escher. **Where, Why, What; Hook; Equip;**

Student will know the basic ideas of transformations such as translation, reflection, rotation, line symmetry, and rotational symmetry. Students will use graphic organizers to draw and rotate lines to create a tessellation. They will be given a handout with definitions and examples to aide their understanding. Peers may discuss possible errors in any transformations. Students will have clarification from their peers and/or myself. Verbal feedback will be given on their graphic organizers and students will be encouraged to discuss any misunderstandings. Students will use their knowledge of transformations, including translation, reflection, rotation and symmetry to create a tessellation. Once they have demonstrated a basic understanding of tessellations and have completed the “Your Turn to Tessellate” handout, they will design their piece of the class' collective tessellation. Student will be able to create figures with rotational symmetry. Student will be able to slide, rotate, or reflect figures to create patterns, specifically tessellations. **Tailor; Explore; Rehearse; Revise/Refine;**

Students will use graphic organizers to draw and rotate lines to create a tessellation. They will be given a handout with definitions and examples to aide their understanding. Peers may discuss possible errors in any transformations. Students will have clarification from their peers and/or myself. Verbal feedback will be given on their graphic organizers and students will be encouraged to discuss any misunderstandings. Students will use their knowledge of transformations, including translation, reflection, rotation and symmetry to create a tessellation. Once they have demonstrated

a basic understanding of tessellations and have completed the “Your Turn to Tessellate” handout, they will design their piece of the class' collective tessellation. Student will be able to create figures with rotational symmetry. Student will be able to slide, rotate, or reflect figures to create patterns, specifically tessellations. Students will be graded on their understanding of the material.  
***Evaluate; Organize/Product; Tailor;***

**Content Notes** – see handouts and textbook

**Handouts -**

- Tessellations (definitions/examples)
- "Your Turn to Tessellate!"
- Lizard Lines
- Lizard Handout